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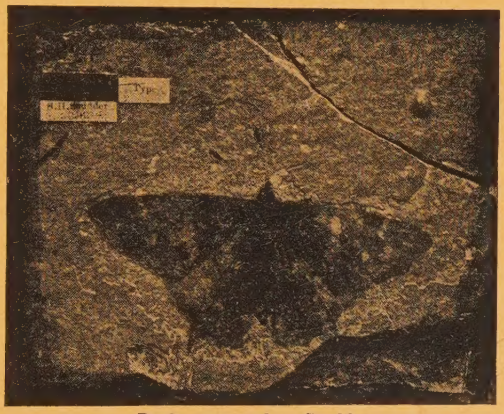

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TWO GYNANDROMORPHOUS ANTS.[1]

By William Morton Wheeler.

Two gynandromorphous ants which have turned up in recent collections are of unusual interest since they differ significantly from any of the similar anomalies previously described. One is a gynandromorph in the strict sense of the term, *i. e.*, a combination of the female and male of our common *Lasius* (*Acanthomyops*) *latipes* Walsh, the other a dinergatandromorph, or combination of the soldier (dinergate) and male of a Philippine ant, *Camponotus* (*Colobopsis*) *albocinctus* Ashmead.

For many years I have been expecting to find a gynandromorphous Lasius, both because the species of this genus are among the commonest and most widely distributed Eurasian and North American ants and because it seemed to me that at least an ergatandromorph, or combination of worker and male characters might occur as readily as in other ants, since these two phases in Lasius are of about the same size. On September 21, 1917, while turning over a large stone at Colebrook, Conn., in a pasture less than a quarter of a mile from the spot in which I took the gynandromorphous Mutillid described in a former number of Psyche,[2] I found a compact cluster of about two hundred of the bright yellow workers of *L. latipes* and in their midst a black insect, which I took to be an unusually large male. I placed the specimens in a vial of strong alcohol and continued my collecting. On returning home I was surprised to find that the dark specimen was a remarkable gynandromorph of a Lasius in which the sexual differences are more extreme than in any other species of the genus or indeed of any of the North American ants, except the Ecitons. Many years ago McClendon and I[3] endeavored to show that *L. latipes* is peculiar

[1] Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 153.

[2] A Gynandromorphous Mutillid. Psyche 17, 1910, pp. 186–190, 1 fig.

[3] Dimorphic Queens in an American Ant (Lasius latipes Walsh). Biol. Bull. 4, 1903, pp. 149–163, 3 figs.

in possessing two forms of females, one, which we called the β-female, being reddish-yellow, with long golden pile, large, flattened femora and tibiæ, short, slender tarsi and incrassated antennæ; and one, which we called the α-female, of a darker color and intermediate in structure and pilosity between the β-female and the female of *L. claviger* Roger.[1] The gynandromorph taken at Colebrook is evidently a combination of the male and β-female. These phases, when they appear as separate individuals measure respectively 4 and 8 mm., and could hardly be combined to form a viable lateral gynandromorph, so that it is probably for this reason that the specimen, as will appear from the description and figure, is of a different type. Unfortunately I did not have access to a dissecting microscope till the specimen had become so thoroughly hardened in the alcohol that I despaired of gaining any satisfactory knowledge of its internal reproductive organs. The gynandromorphous *C. albocinctus* was found among a small series of dried and mounted specimens collected for me in 1917 by Dr. F. X. Williams at Los Baños, near Manila. The following detailed descriptions and the figures will give an idea of the external peculiarities of the two specimens.

Lasius (Acanthomyops) latipes Walsh (Fig. 1)

Gynandromorph. Length 8 mm., being that of the normal β-female, but with the thorax and gaster more slender. Head shaped like that of a normal female, but with the eyes and ocelli much larger and more prominent, the right posterior ocellus smaller than the left and the surface black, with isolated, reddish-yellow spots as indicated by the less densely stippled areas in the figure. Left mandible of the female type, reddish-yellow, smooth, shining, sparsely punctate; right mandible black, like the left in form and size but subopaque and very finely longitudinally striolate as in the male. Clypeus with somewhat more than its right half reddish-yellow (female), the remainder black (male). Antennæ both alike, black, 13-jointed (male) and with slightly swollen first funicular joint but stouter than in the male, in form only slightly approaching the female, as in normal individuals of this sex the scape is incrassated distally and the funiculus is spindle-shaped, with very broad and transverse joints in the middle. The surface

[1] These females are figured in the paper cited and in my ant book (Fig. 55 B and C, p. 94).

of the head is subopaque as in the male and not smooth and shining as in the female, but the pilosity is long as in the latter though the hairs are dark and not golden as in the female. Thorax similar to that of the female but the pro- and epinotum are somewhat narrower and the former is asymmetrical, being shorter on the left than on the right side so that the head is turned to the left. The mesonotum and scutellum are more like those of the male. The thorax is black and has the same sculpture and short, sparse

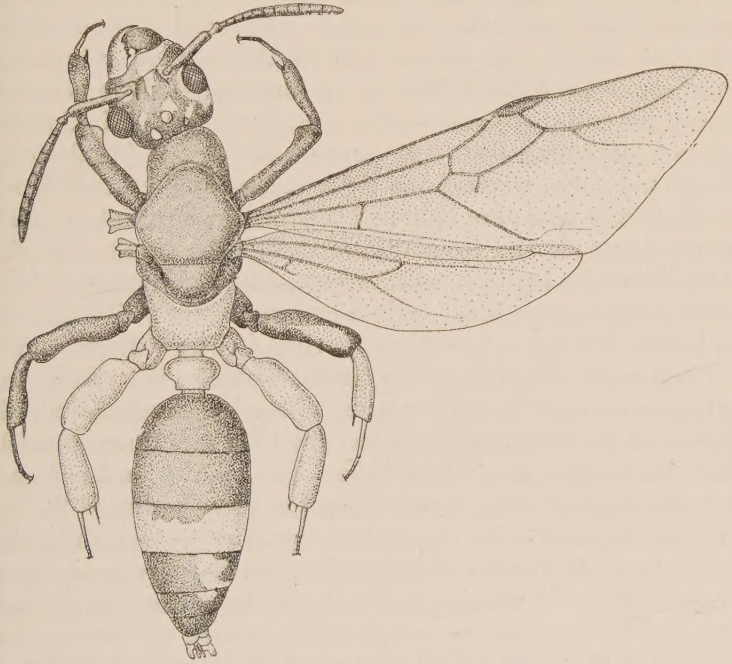

Fig. 1. Gynandromorph of *Lasius* (*Acanthomyops*) *latipes* Walsh.

pilosity as in the male, with the exception of the epinotum, which is reddish-yellow and has the long, abundant, golden hairs of the female. The petiole, too, is entirely of the female type in shape, color and pilosity. The gaster is narrower and more pointed posteriorly than in the normal female and with six visible segments and therefore more nearly of the male type. Its first and second segments are entirely black above (male), the third reddish-yellow (female), except for a black, asymmetrical transverse blotch at the

anterior border on the dorsal surface; the fourth, fifth, and sixth segments are black (male), but the fourth has an irregular reddish-yellow band extending over its full length on the right side above, and the fifth has a small spot of the same color on the same side at the anterior margin. On the ventral side the first segment is black throughout, the second with an oblique reddish-yellow blotch to the left of the median line, the third with a narrow black longitudinal streak in the middle and a large rounded black spot on the left posterior corner. The fourth ventral segment is entirely black and very small, the fifth yellow. External genitalia of the male type, much as in normal individuals but more robust and turned somewhat to the right side. Sculpture, pilosity and pubescence of the gaster as in the male. Legs very peculiar in that the hind pair, including their coxæ, are of the normal female form, pilosity and color, whereas the right fore leg and left middle leg, including their coxæ, are entirely black and in form intermediate between the male and female types though somewhat more like the latter in form and size. Left fore leg black on its extensor and reddish yellow on its flexor surface and more nearly like the normal female fore leg in form than the right fore leg. Right middle leg much more like that of the female than the left middle leg, the coxæ and femur black, the latter with a long fusiform reddish-yellow spot on its extensor surface, the tibia and tarsus reddish-yellow throughout as in the female. The pilosity on the legs is short and sparse (male), except along the flexor border of the left fore tibiæ and on the hind legs where the hairs are long and of the female type. Both pairs of wings are normally developed and in size and shape as in the female, but the hind pair dropped off readily soon after the specimen was placed in alcohol, whereas the fore pair remain firmly attached, showing a pronounced tendency to deälation (female) only in the metathoracic articulations. The fore pair has the posterior half of the recurrent vein absent. This reveals a condition half way between those of the normal female and male, since in the former the recurrent vein is complete and closes the discoidal cell, whereas in the male it is usually entirely absent so that the wing is without a discoidal cell.

The unusual interest of the specimen lies in the fact that it cannot be placed in any of the categories of gynandromorphs, for as a whole it belongs neither to the more frequent lateral, nor to the

rarer anteroposterior, decussating, mosaic or blended types, but exhibits a mixture of all of them. The mandibles and clypeus have the sexual characters of the lateral type but the arrangement of colors in the clypeus is the reverse of that of the mandibles and hence decussating. The head is female in form but partly blended, partly mosaic and feebly lateral. The eyes, antennæ, anterior ocellus and left posterior ocellus are strongly male. The right posterior ocellus, the right eye, which is distinctly smaller than the left, and the large area of reddish-yellow integument surrounding it, show that the right side of the head is more female than the left. The thorax in front of the epinotum is a blend of male and female characters, the pronotum being more female, the mesonotum and scutellum more male as are also the color, sculpture and pilosity of these three regions, whereas the epinotum and petiole are purely female. The wings are female but with the female tendency to deälation only in the hind pair and the reverse or male tendency to persistence in the articulations of the anterior pair. But the latter show in the retention of the anterior half of the recurrent vein a very interesting condition precisely half-way between that of the normal male and female wing. The hind legs are purely female but the two anterior pairs show a peculiar decussation, the left fore and right middle leg being more female in form and coloration and the right fore and left middle leg more male. This decussation of characters is similar to that of the mandibles and clypeus but less pronounced. It is very probable that the internal reproductive organs are more or less hermaphroditic, as they are situated in segments which externally exhibit a very striking mosaic of male and female characters.

Camponotus (Colobopsis) albocinctus Ashmead (Fig. 2*c*)

Dinergatandromorph. Length 4 mm.

In all respects like a normal soldier, except in its smaller size (the normal soldier measures about 5 mm.) and in having the head asymmetrical, with its smaller right half exhibiting male characters. The right eye is larger, more convex and nearer the middle of the side of the head than the left. The right antenna is 13-jointed, with the terminal joint short and aborted, and the right mandible, though much shorter than in the male (Fig. 2*a*) has only two teeth separated by a wide concavity of the apical border.

The clypeus on the right side has the lateral extension characteristic of the male and the same type of frontal carina, whereas the left frontal carina is prolonged backward as in the soldier (Fig. 2[b]) but does not border so deep a scrobe-like depression. In the soldier the head is ferruginous or yellowish-red, with its posterior third infuscated, but in the male entirely black. In the dinergatandromorph the infuscation extends much further forward between the frontal carinæ and onto the right side. There are no

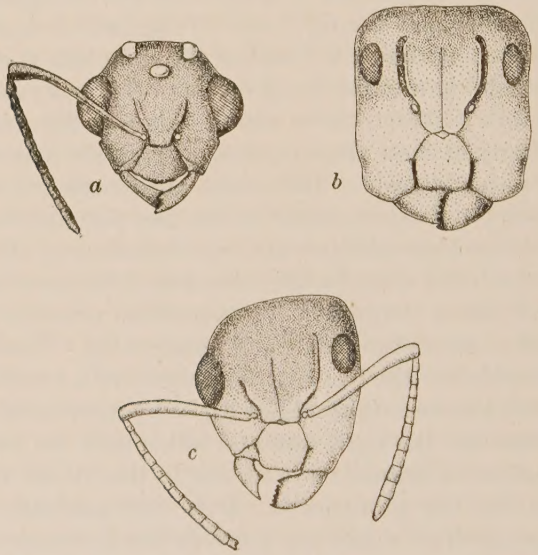

Fig. 2. *Camponotus* (*Colobopsis*) *albocinctus* Ashmead. *a*, head of male; *b*, of soldier; *c*, of dinergandromorph.

traces of ocelli. As the thorax, petiole, gaster and legs are in all respects like the corresponding parts of a normal though small soldier the internal reproductive organs are, in all probability, those of a normal soldier, *i. e.* of the abortive female type.

I have not seen the worker of *C. albocinctus* but there can be no doubt that as in other species of the subgenus it has a small head, more rounded, less rectangular and narrower in front than in the soldier, with less convex mandibles and the clypeus shaped more as in the male. The species of *Colobopsis* are peculiar in having sharply marked soldier and worker forms, whereas in other sub-

genera of *Camponotus* the workers are polymorphic, *i. e.* form a more or less evenly graded series from maximal to minimal individuals. To my knowledge this is among ants the only known gynandromorph that exhibits an unmistakable combination of male and soldier characters. In other cases the male characters are combined either with the worker or with the female. Even the lateral gynandromorph of *Camponotus ligniperda*, described and figured by Klapálek,[1] represented a combination of the male and worker minor. .

The dinergatandromorph of *C. albocinctus* seems to me to be very significant in connection with the previously known thirty Formicid gynandromorphs and the *Lasius latipes* described above.[2] It is evident that the male characters may be combined not only with the female as in the gynandromorphs of other animals, but also with the soldier and worker. And although the latter are abortive females, they nevertheless behave in combination with the male like entities quite as distinct and independent as the fertile female. This suggests that the worker and soldier are not products of nutrition but are germinally predetermined. In other words, it would seem that in ants with male, female and worker castes, we must postulate three, in species with a soldier caste, four different kinds of eggs. This view is also supported by the following considerations: first, Bugnion and Miss Thompson have shown that in termites, which have developed castes surprisingly like those of ants, the soldiers, workers and sexual forms can be recognized as distinct *on hatching from the egg;* second, embryological study has shown that the insect egg is the most precociously specialized of all animal ova, so specialized, in fact, that not only the anterior and posterior poles but also the dorsal and ventral and right and left sides of the organism that is to arise from it are morphologically predetermined even before the extrusion of the polar bodies; and third, artificial castration has shown that operations on the primary sexual characters of young insect larvæ fail to disturb the development of the secondary sexual characters and instincts.

[1] Obojetnik Camponotus ligniperdus Latr. Sitzb. Böhm. Ges. Wiss., 1896, 4 pp., 2 figs.; Wheeler, Some New Gynandromorphus Ants, with a Review of the Previously Recorded Cases. Bull. Amer. Mus. Nat. Hist. 19, 1913, p. 675, Fig. 11.

[2] Reviews of the known cases are given in my papers: Some New Gynandromorphous Ants, etc., *loco citato*, pp. 653–683, 11 figs. and Gynandromorphous Ants Described during the Decade 1903–1913. Amer. Natural, 48, 1914, pp. 49–56.

All these considerations point to the conclusion that in such very ancient and extremely specialized organisms as insects, sex and caste peculiarities have been impressed on the organization of the very young egg and are not determined by fertilization or by the incidence of trophic stimuli during larval development. I was, therefore, led in my first paper on the ant gynandromorph to postulate its origin from a pair of fused oöcytes. The difference between the various types of gynandromorphs—lateral, frontal, mosaic, blended, etc.—was supposed to be due to the differences in the two kinds of ova, the plane of their fusion, regulatory tendencies that would avoid reduplication of organs, and differences in growth in the component ova or their parts to account for such cases of imperfect lateral gynandromorphs, as *e. g.* that of the *Camponotus albocinctus* described above, in which the male is so much smaller than the soldier component. My views have been treated as rankly heretical by Boveri[1] and his pupil, Fräulein Elsa Mehling,[2] but Cockayne,[3] who has recently made a comprehensive study of Lepidopteran gynandromorphs, while pointing to certain defects in my hypothesis, remarks that "it explains better than any other how in heterochroic gynandromorphs the areas occupied by the two colors and two sexes are identical. "He also mentions with approval the fact that "Doncaster has recently suggested that a gynandromorph is produced by the fertilization of each of the nuclei of a binucleate ovum by a separate spermatozoon. He has proved the existence of these binucleate ova and has actually proved the conjugation of a separate spermatozoon with each and seen the resultant mitoses." I should, of course, regard such a binucleate ovum as the first result of the fusion of two ova. The hypothesis of Boveri and Fräulein Mehling, according to which the gynandromorph arises from an egg in which one of the two first cleavage nuclei unites with a sperm, is disproved, according to Cockayne "by the existence [in certain Lepodoptera] of perfect halved gynandromorphous hybrids both sides of which show equal admixture of the characters of both parents." Morgan has more recently endeavored to account for gynandromorphs

[1] Ueber die Entstehung der Eugsterschen Zwitterbienen Arch. Entwickl. Mech. Org. 41, 1915, pp. 264–311, 2 pls.

[2] Ueber die Gynandromorphen Bienen des Eugsterschen Stockes. Verhandl. phys. med. Ges. Würzburg 43, 1915, pp. 173–236, 8 pts.

[3] "Gynandromorphism" and Kindred Problems. Journ. Genet. 5, 1916, pp. 75–129, 5 pts.

in *Drosophila* as due to a lagging sex-chromosome. As a full account of his researches has not yet been published, I am unable to undertake the task of harmonizing it with what I conceive to be the conditions in the Formicidæ.

A MALFORMED *LEPTINOTARSA DECEMLINEATA*.

By C. L. Metcalf,
Ohio State University.

The two accompanying illustrations show an interesting and peculiar malformation of a specimen of the Colorado potato beetle. The specimen was collected by Mrs. Cleo F. Metcalf at Orono, Maine, August 17, 1916. It was taken in company with many normal individuals feeding upon potato. Unfortunately its peculiar condition was not noted until it had been killed. A prolonged search failed to reveal any other specimens in any way abnormal. The chief purpose in describing it here is to record for the curious naturalist, who does not lack a sense of humor, a freakish, though not uncomely, product of one of nature's sportive moods.

Fig. 1. Malformed *Leptinotarsa decemlineata*, showing anomaly in structure and pattern of the elytra; below, same in lateral view. About three times natural size.

The visible abnormality consists of a deep, V-shaped excision of each elytron extending from the apex to about the basal third of the normal elytron. The elytra are a little foreshortened; the middorsal line is nearly straight in side view; and the usual convexity covering the tip of the abdomen is entirely wanting, leaving the abdomen exposed from behind.

The two forks of the elytron formed by the excision are unequal, the median fork being about twice as wide at base and somewhat longer. The lateral fork is bent sharply ventro-laterad and is sinuate, its tip especially curving away from the excision. The apex of the excision is broadly rounded; its sides are convex inward.

The color markings are as little disturbed as could well be,—the black suture and five black stripes on each elytron being readily recognizable. The first and second stripes run nearly their full length. The third runs a little mediad of the apex of the excision, shows a slight tendency to fork to the outer prong, and margins the inner prong about halfway to its apex, gradually attenuating to a point. Its course is such as not to encroach upon the normal width of the intervening yellow stripe. The second and third stripes do not, therefore, unite toward the apex as in the typical individual. The fourth black stripe has a slightly different position on the two elytra. On the left it runs just laterad of the apex of the excision margining the outer prong with black, within, almost to its apex; gradually narrowing. On the right elytron the fourth stripe curves abruptly about three millimeters from the humerus, eluding the margin of the excision over its basal half, thence terminating in normal width; after which the margin is again yellow. The fifth stripe runs about a normal course with respect to the margin of the elytron. This stripe and the yellow interval between it and the fourth stripe are somewhat abnormally widened about mid-length.

The most noteworthy feature of the insect is the very close symmetry of the two malformed elytra. Besides the slight difference in the course of the fourth stripe, the only discrepancy is in the length of the elytra at the suture; the left one exceeds the right by about a half millimeter.

It is interesting to speculate as to the probable cause of such development. Mere mechanical injury or pressure would seem to be an inadequate explanation, unless presumed to occur at a very early stage. The close similarity of the anomaly in the two wings seems to me to point to a deep-seated, physiological disturbance, the nature of which I am entirely unable to conjecture.[1]

It is unfortunate that the specimen was not noted in time to make possible extensive observations of its behavior, and that an examination of the internal structures of the fresh specimen was neglected. The specimen is in the collection of the writer.

[1] See Brues, Charles T., The Structure and Significance of Vestigial Wings among Insects. Biol. Bull., Vol. IV., No. 4, March, 1903, pp. 179–190.

NEW SPECIES OF THE GENUS VILLA (*ANTHRAX*).

By Charles W. Johnson,
Boston Society of Natural History, Boston, Mass.

In my work on the Dipterous fauna of New Jersey and New England, two species of this genus have been the source of considerable misgivings. One has been associated with *Anthrax morio* as a possible variation. The other was determined by the late D. W. Coquillett as *Anthrax lepidota* O. S. The former is quite widely distributed, while the latter, as far as known, is confined to "pine barrens" of New Jersey. The following diagnoses are given, pending further studies and figures of our eastern species.

Villa webberi sp. nov.

♂ ♀. Face and front black, with blackish pile and sparse yellowish tomentum, antennæ black, the style about as long as the three joints taken together. Thorax and scutellum black, pile black, longer and more dense on the pleura, brown in front and whitish on the posterior angles. Abdomen black, pile blackish, white on the sides of the first, second and sixth segments. A sparse yellowish tomentum (easily denuded) is present on most of the segments, especially along the posterior margins. Legs yellowish, front and middle femora, except the tips, and all of the tarsi, dark brown, tomentum yellowish, spines black. Halteres black, tips of the knobs whitish. Wings about half black and half hyaline. The irregular dividing line crossing the following cells: marginal just before the tip of the first vein, near the basal fourth of the first submarginal, and basal third of the first posterior, middle of the discal, basal angle of the third posterior, basal fourth of the fourth posterior, middle of the anal and basal third of the axillary cell. Length of holotype 6 mm., allotype 9 mm., paratypes vary from 5 to 10 mm.

Twenty-one specimens. Holotype, Lunenburg, Mass., June 3, 1914 (R. T. Webber); allotype, Great Barrington, Mass., June 16, 1915, and four paratypes, Mt. Ascutney, Vt., July 11, 1908, Bennington, Vt., June 21, 1915, Brookline, Mass., June 17, 1918, and Darien, Conn., June 10, 1912 (C. W. Johnson), in the collection of the Boston Society of Natural History. The other paratypes, Brookline, Mass., June 17 (C. W. J.), Lunenburg, Mass., June 5 to 25

(Webber), Montreal, Can., June 11 (Chagnon), Ottawa, June 14 (Bro. Germain), Canada and Kentucky (Mus. Comp. Zoöl.), and near Lander, Wyo., June (Roy Moodie) are in the collections of the Museum of Comparative Zoölogy, McGill Univ., Ottawa Museum, Gipsy Moth Laboratory and the author.

Readily separated from *A. morio* by the less amount of black, which in *morio* covers about two-third of the wing, filling nearly all of the anal and axillary cells, and a slightly larger proportion of the other cells. In the color of the wings it resembles more closely *A. bigradata* Loew and *A. edwardsi* Coq., but lacks the light colored pile characteristic of those species.

Villa lepidotoides sp. nov.

Anthrax lepidota Johnson (*non* Osten Sacken) Smith's Insects of N. J. Ann. Rept., N. J. State Museum, 1909 (1910), p. 746.

♂. Head black, with sparse yellow tomentum and black hairs, antennæ black. Thorax and scutellum black, with golden yellow tomentum, on the sides between the humeri and wings. The tomentum is longer and whitish, on the pleura yellow. Abdomen black, first and base of the second and fourth segments broadly banded with white; tomentum, the extreme posterior edges of which are yellowish, the last two segments with yellow tomentum and black hairs. Legs black, with sparse yellowish tomentum, the rows of spines on the posterior tibiæ conspicuous, on the front and middle tibiæ absent. Halteres brown with a yellowish-white knob. Wings hyaline with about one-third of the anterior dark brown, the line between the brown and hyaline crossing the following cells: near the extreme tips of the costal, outer two-thirds of the marginal, near the base of the first submarginal and first posterior (forming small squares of brown at the base of each), basal fourth of the discal and fourth posterior and middle of the anal cell. This leaves all of the second submarginal, the second and third posterior and the axillary cell hyaline. A subhyaline spot is present near the end of the second basal cell. Length, 5 mm. One specimen, collected by the late Erich Daecke, at Iona, Gloucester Co., N. J., June 16, 1902. Type in the author's collection.

Similar to *A. lepidota* O. S. from Mexico and Southern California, but readily separated by the yellow tomentum of the thorax and scutellum and the three bands of whitish tomentum on the abdo-

men. The venation also differs, the veins forming the outer portion of the submarginal cell are less sinuous, the anterior branch of the third vein reaching the margin at the tip of the wing and not before the tip. The fifth vein forming the posterior margin of the discal cell is also less curved. The brown extends slightly further into the first and fourth posterior cells giving the margin a trilobed appearance.

Villa bigradata (Loew).

Anthrax bigradata Loew, Cent., viii, 37, 1869.

A specimen from Muskeget Island, Mass., June 18, 1913, collected by Dr. G. M. Allen, and a specimen from Provincetown, Mass., June 13 (Webber), can only be referred to this West Indian species. Coquillett records it from Califronia. This distribution is interesting, though not unusual as several members of this family have a similar or much wider distribution.

SYNCHRONOUS MOVEMENTS IN *VANESSA ANTIOPA* LARVÆ, WITH NOTES ON THE ATTRACTION OF CERTAIN MALE LEPIDOPTERA BY THE FEMALES OF THEIR OWN SPECIES.

By Fred H. Walker,
Salem, Mass.

About the middle of last April, while taking my regular Sunday morning walk along a favorite woodland path, I saw a *Vanessa antiopa* depositing her eggs on a willow sapling. I broke off the twig with the eggs attached, carried them home and placed them in a breeding cage. The larvæ appeared in 17 to 18 days, went through the regular course of feeding and moulting and the latter part of May developed into a fine brood of over one hundred full-grown caterpillars. One evening a few days before pupation began, the cages (the colony had been divided and now occupied two cages) were brought out to the light for the purpose of putting in fresh food for the occupants, one cage being set on top of the other. The cages were partially filled with small willow branches, and the caterpillars were scattered all over the cages, some on the top and sides and others on the leaves and branches.

After they had been in the light a few minutes, I noticed that each and every caterpillar was moving its head up and down with a sort of a twitching motion, in perfect synchronism. These movements occurred at intervals of about two seconds and continued for about five minutes after they were first noted; I cannot say that I saw the beginning of this performance, but all the caterpillars in both cages were moving their heads vigorously when first noted, and at the end the movements stopped gradually until all were at rest. The following night I prepared to resume my observations, this time placing the cages about ten feet apart, but on this occasion during an hour's vigil no movement took place and the second day afterward pupation began.

Professor Edward S. Morse of Salem and others have observed and recorded the synchronous flashing of thousands of fireflies[1] which would not seem to be simply accidental considering the large numbers involved. In conversation with Mr. A. P. Morse of Wellesley, he said that if his recollection was correct, he had seen when a boy synchronous movements in a colonial black and yellow larva on oak, probably a species of Anisota; also in Datana (probably *ministra*) on black walnut; and in a green and black sawfly larva on gray birch.

In my observations on the *Vanessa antiopa* larvæ the movements doubtless signified alarm and were possibly protective, but why the alarm shown but once after several weeks of the same routine and then the perfect synchronism in both cages? By a process of elimination in regard to the known sensory equipment of insects, I get no satisfactory results; a floor of wood and tin precludes the use of sight organs, not the least sound could be detected and the slender legs of the upper cage were the only material path excepting the air through which vibrations could be transmitted.

The theory of vibratory communication would seem the most probable, and if it were known that insects could transmit as well as receive vibratory impressions, it would explain many things. Folsom says of insects:

"They have many curious integumentary organs which from their structure and nerve connections are probably sensory end organs, though their functions are either doubtful or unknown. Such an organ is the sensillum placodeum—function doubtful;

[1] *Science*, July 26, 1918, pp. 92–93.

not auditory and probably not olfactory, though the function is doubtless a mechanical one."

Before passing from mechanical considerations, it should be noted that the telephone receiver and transmitter are practically of the same construction, and while rejecting any electrical influence, if insects are equipped with means for receiving vibrations, it may also be possible for them to transmit them.

In the matter of the attraction of the males of certain species of moths by the females at apparently long distances, Fabre notes that the male moths came with the wind at one time, and that the reflux of scented atoms in a direction contrary to the aerial current seems inadmissible.

I have tried the experiment of fastening a female *turnus* butterfly to a twig with varying results. On one occasion during the summer of 1917 I captured what appeared to be a freshly emerged specimen of this species and even before the act of securing it to a leaf was completed, the males began to arrive and I took about twenty specimens in a short time. They came from many directions, sometimes varying greatly from a direct line but always reaching the goal. If I remember correctly a light air was stirring, the butterflies coming with the wind as well as against it. The sense of smell was doubtless the controlling factor for a limited distance, as however erratic the flight at a distance the course was direct in the last few rods.

Smell concerns matter and it is difficult to conceive of the divisibility of matter to such an extent as to fill the air with scent atoms unperceived by the human sense of smell particularly against the wind or in the absence of perceptible air currents except for limited distances. Fabre[1] endeavored to mask or stifle any possible effluvia emanating from his female moths by surrounding them with various noxious odors but apparently without the slightest effect, the males arriving in undiminished numbers and without hesitation.

In strict justice to the case of *Sympathetic Vibratory Communication* vs. *The Sense of Smell*, I shall have to testify for the defendant in so far as to say that a female dog belonging to a neighbor at certain times seemed to attract the males from all directions regardless of air currents; and her only known external vibratory organ had been amputated in infancy.

[1] Life of the Caterpillar, pp. 275, 276.

Postscript. Since writing the above paper, Mr. A. P. Morse has called my attention to an article in the American Museum Journal of February, 1918, p. 145, by Mr. W. L. McAtee who quotes Mr. E. A. Goldman of the U. S. Biological Survey mentioning a curious instance of synchronal insect movements: "When looking among the tree tops for birds, he has been taken unawares by an army of these (driver) ants. The soldiers of the driver ants have tremendously developed heads and jaws; their bite brings blood and they hang on till the heads are pulled off. The most interesting feature of their attack is the remarkable unanimity with which they set their teeth (?) into the skin. Whether they accomplish this by mental telepathy or otherwise, the fact remains that several ants scattered here and there over one's anatomy all decide to bite at one particular moment."

It may be that the action of the pulse was the stimulating influence that caused the ants to bite Mr. McAtee all at the same moment. Prof. W. M. Wheeler writes me: "There is doubt in my mind about McAtee's interpretation of the simultaneous biting of the soldiers of the driver ants. It may be merely a simultaneous response to the movement of the body of the person covered with ants. Such a movement of the skin would act as a stimulus and cause all the irritated ants to use their mandibles at the same moment. I have a feeling that I have noticed something of the kind in the tropics in other ants."

NEW RECORDS OF ORTHOPTERA IN NEW ENGLAND.

By Albert P. Morse.
Wellesley College, Wellesley, Mass.

Parcoblatta lata Brunner. This common native wood-roach of more southern range (formerly placed in genus Ischnoptera) has been taken in New England in a single instance. It was captured by me on July 13 on the ground floor of a dwelling-house at Wellesley, Mass., and identified and recorded by Hebard, who regards it as adventive in New England.

Manomera blatchleyi Caudell. An adult female of this walking-stick was taken by me at Greenwich, Conn., August 25, 1892, and

laid eggs after capture. An immature female was taken at the same place and time.

Amblycorypha floridana carinata Rehn and Hebard. Half a dozen examples of this northern race of a southern katydid are recorded by Rehn and Hebard from Nantucket and Woods Hole, Mass.

Scudderia curvicauda borealis Rehn and Hebard. This is a diminutive boreal race of our common Curve-tailed Bush-Katydid. I took a very few examples at Orono in central, and Cherryfield and Whitneyville in eastern Maine, August 5 to 30, 1913. These were found among shrubbery on cold, heath-grown bogs.

Conocephalus spartinæ Fox. This brightly-colored little long-horned grasshopper is locally abundant on saltmarshes along the New England coast. Fox described it from Woods Hole, Mass. I took it years ago at Stamford and Niantic, Conn.; at Faneuil Station, Mass., before the construction of the Charles River Basin and the freshening of the marsh at that point; and more recently at Rowley, Mass., and York Beach and Pine Point near Old Orchard, Me. It is in the Scudder collection from Cape Cod. It thus agrees closely in extent of distribution in New England with the Seaside Locust, *Trimerotropis maritima.*

Conocephalus saltans Scudder. Locally common on the sandy moors of Nantucket, Mass., among bunchgrass (Andropogon scoparius), wild indigo (Baptisia tinctoria), and huckleberry bushes. The presence of this flightless grasshopper on Nantucket is of especial significance in its bearing on the geological conditions which resulted in the dispersal and present distribution of the characteristic plants and animals of the sandy coast-plain of New Jersey northeastward.

Diestrammena marmorata DeHaan. This Asiatic cave- or camel-cricket has established itself from time to time in greenhouses and cellars nearly all over the world. It has been sent me from Kennebunk, Me., and Springfield, Mass., and I have taken it in numbers at Danvers, Mass., a locality first called to my attention by the late Rev. H. W. Winkley.

Ceuthophilus gracilipes var. *stygius* Scudder. A male, taken at Beverly, Mass., is in the collection of the Boston Society of Natural History.

Ceuthophilus neglectus Scudder. (Diagnostic note.) This species differs from all our other New England species in the structure of the abdomen of the male and can usually be recognized at once by the yellowish color of the underparts, and the following points: the ninth tergum is usually completely hidden by the crescentically thickened parabolic hind margin of the eighth tergum; the subgenital plate is also distinctive,—short, scoop-shaped, with thickened, semicircular, nearly horizontal margin.

Nemobius griseus E. M. Walker. I have taken this cricket sparingly on sandy tracts at Brunswick, Me., Provincetown, and South Sudbury, Mass., in September.

Nemobius maculatus Blatchley. Mr. B. H. Walden has sent me this species from New Canaan, Conn., taken in September.

Gryllotalpa vulgaris Latreille. I found three examples of this, the common European mole-cricket, in the collection of local insects of the Maria Mitchell Scientific Association at Nantucket. They were without data but believed to have been taken on the island. This is highly probable, since another European orthopteron, a flightless bush-katydid, *Leptophyes punctatissima*, has been captured there by Prof. H. T. Fernald. Both species were doubtless introduced in commercial importations of plant material from Europe, such as Scotch broom, pines, and heather.

Acrydium granulatum incurvatum Hancock. This is the western broad-shouldered form of our common Angulate Pygmy or Grouse Locust. Mr. C. W. Johnson has taken examples at Capens and Sugar Island, Moosehead Lake, Me., in July.

Acrydium hancocki Morse. This robust ally of our common Ornate Pygmy Locust, described from and common in Iowa, I took at Randolph, N. H., in July, 1898, and in the summer of 1913 found it at Fort Kent, Fort Fairfield, and Houlton, Me., August 24 to 28.

Acrydium arenosum angustum Hancock. This Pygmy Locust is well-distributed in New England. I have taken it at various points from Cherryfield in eastern Maine, and Newport in northern Vermont, to Nantucket, Mass., and New Haven, Conn.

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Wanted: Insects of the family Embridæ (Scoptera). I would give insects of any order except Lepidoptera. I would like to correspond with persons interested in this family.—Raoul M. May, 2202 W. 10th St., Los Angeles, California.

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Wanted for cash: Lowest representatives of all families of insects, preserved in fluid.—G. C. Crampton, Amherst, Mass.

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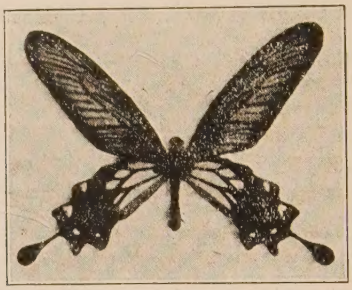

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